

Msc Thesis at MAN Energy Solutions Schweiz AG

Hardstrasse 319

8005 Zürich

Title:

Transient System Simulation and Process Control Analysis of the Tri-generation (heat-cold-electricity) ETES System

Situation:

MAN Energy Solutions is a leading manufacturer of industrial rotating equipment and engineering of energy systems.

MAN-ES range of goods includes complete marine propulsion systems, turbomachinery units for the oil & gas and process industries as well as complete power plant solutions.

Currently new applications are explored in the energy storage sector, in particular the thermal energy storage (ETES) system developed by ABB and MAN-ES. Process engineering and turbomachines are the key competences for the development and industrialization of the system. Process modelling, simulation and tools development is an essential work package linked to the ETES project

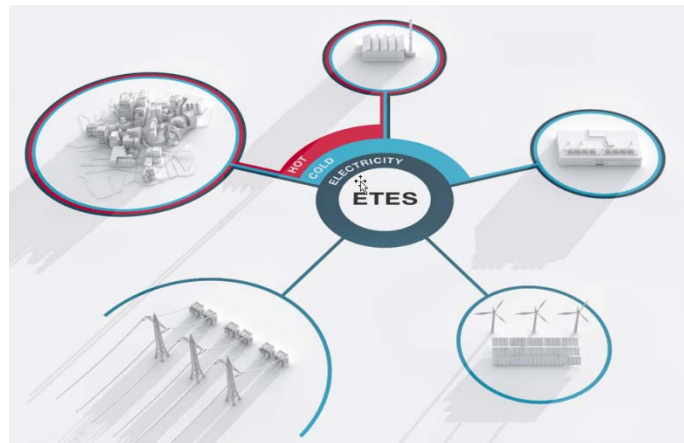


Fig 1: ETES is a tri-generation Energy Management System

Work Description:

- Transient Modeling and Simulation of the complete ETES system, incl. energy flows and balance for the import and export (i.e. load profiles) in several applications (for instance district heating, cooling, or various industrial processes)
 - modelling of start-up, shut-down, transient modes of operations
 - off-design modelling and simulation after implementation of specific components operation curves (predicted or “as built” characteristics)
- Simulations of different operating modes and establishment of a control strategy
 - preliminary analysis of the control system capabilities and limitations
 - optimization of the operation for practical use cases
 - development of a first (preliminary) energy management concept
- Comparison / validation of the model with test bed runs results (achieved by another engineering group)



Skills required:

- Bsc or at best Msc in Mechanical Engineering
- Knowledge and experience with Modelica mandatory
- Knowledge in C++ / Python or Matlab recommended
- strong programming & simulation interest and enthusiasm
- technical background in thermodynamic, energy systems and processes
- technical background in control systems, automation
- capability of solving complex problems in an autonomous way
- capability of taking over models developed by others
- Sense for innovation
- Open and problem solving attitude

By interest please refer to:

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